

THAT WHICH IS CLAIMED IS:

1. A method of forming a sound attenuating laminate, comprising:

ascertaining acoustic properties of an article on which the sound attenuating laminate is to be placed to identify areas wherein additional sound attenuation characteristics are necessary;

forming a substrate in the shape of the article; and

applying polyurethane on the substrate, wherein the polyurethane is applied substantially only in the identified areas wherein enhanced sound attenuation characteristics are required.

2. The method of Claim 1, wherein the substrate comprises thermoformable fibrous material.

3. The method of Claim 1, wherein the polyurethane is applied by spraying.

4. The method of Claim 3, wherein the polyurethane comprises a filler selected from the group consisting of calcium carbonate, calcium hydroxide, aluminum trihydrate, talc, bentonite, barytes, silica, clay and mica.

5. The method of Claim 1, wherein the article is a firewall and the sound attenuating laminate is a dashboard insulator.

6. The method of Claim 1, wherein the article is a vehicle floor and the sound attenuating laminate is a floor covering.

7. The method of Claim 1, wherein the article is a vehicle panel and the sound attenuating laminate is a vehicle interior trim component.

8. The method of Claim 1, wherein ascertaining acoustic properties of an article comprises identifying areas of the article through which sound within a predetermined frequency range passes at an intensity level that exceeds a threshold intensity level.

9. The method of Claim 8, wherein the substrate comprises opposite first and second surfaces and is configured to be attached to the article in face-to-face relationship therewith, and wherein applying polyurethane on the substrate comprises applying polyurethane onto the substrate first surface.

10. The method of Claim 1, wherein applying polyurethane on the substrate comprises:

applying polyurethane on the substrate to form a polyurethane layer having a substantially constant thickness; and

spraying additional polyurethane on one or more selected portions of the polyurethane layer.

11. The method of Claim 1, wherein applying polyurethane on the substrate comprises applying polyurethane on the substrate to form a polyurethane layer having a first thickness in a first portion and a second thickness greater than the first thickness in a second portion.

12. The method of Claim 1, wherein ascertaining acoustic properties of an article on which the sound attenuating laminate is to be placed to identify areas wherein enhanced sound attenuation

5 characteristics are required comprises generating a sound intensity map of the article.

13. The method of Claim 1, wherein applying polyurethane on the substrate comprises:

identifying areas of the substrate in which apertures are to be formed; and

5 avoiding the identified areas when applying the polyurethane onto the substrate.

14. The method of Claim 1, wherein the substrate has one or more recessed portions formed therein, and wherein applying polyurethane onto the substrate comprises applying polyurethane into the one or  
5 more recessed portions.

15. The method of Claim 1, wherein forming a substrate in the shape of the article comprises integrally forming a secondary article with the substrate, and wherein applying polyurethane onto the  
5 substrate comprises applying polyurethane into areas adjacent the secondary article.

16. A method of forming a sound attenuating laminate, comprising:

ascertaining acoustic properties of an article on which the sound attenuating laminate is to be placed  
5 to identify areas wherein additional sound attenuation characteristics are necessary;

applying a layer of polyurethane within a mold;  
applying additional polyurethane to the polyurethane layer at selected locations where enhanced  
10 sound attenuation characteristics are required;

attaching a substrate to the layer of polyurethane; and

forming the substrate and polyurethane into a

sound attenuating laminate having a shape of the article.

17 The method of Claim 16, wherein the substrate comprises thermoformable fibrous material.

18. The method of Claim 16, wherein the polyurethane is applied by spraying.

19. The method of Claim 18, wherein the polyurethane comprises a filler selected from the group consisting of calcium carbonate, calcium hydroxide, aluminum trihydrate, talc, bentonite, barytes, silica, clay and mica.

20. The method of Claim 16, wherein the article is a firewall and the sound attenuating laminate is a dashboard insulator.

21. The method of Claim 16, wherein the article is a vehicle floor and the sound attenuating laminate is a floor covering.

22. The method of Claim 16, wherein the article is a vehicle panel and the sound attenuating laminate is a vehicle interior trim component.

23. The method of Claim 16, wherein ascertaining acoustic properties of an article comprises identifying areas of the article through which sound within a predetermined frequency range passes at an intensity level that exceeds a threshold intensity level.

24. The method of Claim 23, wherein the substrate comprises opposite first and second surfaces and is configured to be attached to the article in face-to-face relationship therewith, and wherein applying

5 polyurethane on the substrate comprises applying  
polyurethane onto the substrate first surface.

25. The method of Claim 16, wherein  
ascertaining acoustic properties of an article on which  
the sound attenuating laminate is to be placed to  
identify areas wherein enhanced sound attenuation  
5 characteristics are required comprises generating a sound  
intensity map of the article.

26. The method of Claim 16, wherein forming  
the substrate and polyurethane into a sound attenuating  
laminate having a shape of the article comprises  
integrally forming a secondary article within the  
5 substrate.

27. A sound attenuating laminate configured to  
be attached to an article, comprising:  
a substrate having a shape of the article; and  
polyurethane attached to selected portions of  
5 the substrate, wherein the polyurethane is non-porous and  
is configured to attenuate sound passing through the  
substrate.

28. The sound attenuating laminate of Claim  
27, wherein the substrate comprises thermoformable  
fibrous material.

29. The sound attenuating laminate of Claim  
27, wherein the polyurethane comprises a filler selected  
from the group consisting of calcium carbonate, calcium  
hydroxide, aluminum trihydrate, talc, bentonite, barytes,  
5 silica, clay and mica.

30. The sound attenuating laminate of Claim  
27, wherein the polyurethane comprises:

a layer of polyurethane having a substantially constant thickness; and

5 additional non-porous polyurethane added to one or more selected portions of the polyurethane layer.

31. The sound attenuating laminate of Claim 27, wherein the polyurethane comprises a layer of polyurethane having a first thickness in a first portion and a second thickness greater than the first thickness  
5 in a second portion.

32. The sound attenuating laminate of Claim 27, wherein the substrate comprises opposite first and second surfaces, wherein the first surface is configured to be attached to the article in contacting face-to-face  
5 relationship therewith, and wherein the polyurethane is attached to selected portions of the substrate second surface.

33. The sound attenuating laminate of Claim 32, further comprising additional non-porous polyurethane added to one or more selected portions of the polyurethane.

34. The sound attenuating laminate of Claim 32, wherein the substrate first surface has one or more recessed portions formed therein, and wherein polyurethane is applied in the one or more recessed  
5 portions.

35. The sound attenuating laminate of Claim 32, wherein the substrate second surface has one or more recessed portions formed therein, and wherein polyurethane is applied in the one or more recessed  
5 portions.

36. The sound attenuating laminate of Claim 32, wherein the substrate comprises a secondary article integrally formed therewithin and further comprising polyurethane applied to the substrate at one or more areas adjacent the secondary article.

37. The sound attenuating laminate of Claim 27, wherein the article is a firewall and the sound attenuating laminate is a dashboard insulator.

38. The sound attenuating laminate of Claim 27, wherein the article is a vehicle floor and the sound attenuating laminate is a floor covering.

39. The sound attenuating laminate of Claim 27, wherein the article is a vehicle panel and the sound attenuating laminate is a vehicle interior trim component.

40. A vehicle, comprising:  
a panel; and  
a sound attenuating laminate attached to the panel, wherein the sound attenuating laminate comprises:  
a substrate having a shape of the panel;  
and  
polyurethane attached to selected portions of the substrate, wherein the polyurethane is non-porous and is configured to attenuate sound passing through the vehicle panel and substrate.

41. The vehicle of Claim 40, wherein the substrate comprises thermoformable fibrous material.

42. The vehicle of Claim 40, wherein the polyurethane comprises a filler selected from the group

consisting of calcium carbonate, calcium hydroxide,  
aluminum trihydrate, talc, bentonite, barytes, silica,  
5 clay and mica.

43. The vehicle of Claim 40, wherein the  
polyurethane comprises:

a layer of polyurethane having a substantially  
constant thickness; and

5 additional non-porous polyurethane added to one  
or more selected portions of the polyurethane layer.

44. The vehicle of Claim 40, wherein the  
polyurethane comprises a layer of polyurethane having a  
first thickness in a first portion and a second thickness  
greater than the first thickness in a second portion.

45. The vehicle of Claim 40, wherein the  
substrate comprises opposite first and second surfaces,  
wherein the first surface is configured to be attached to  
the panel in contacting face-to-face relationship  
5 therewith, and wherein the polyurethane is attached to  
selected portions of the substrate second surface.

46. The vehicle of Claim 45, further  
comprising additional non-porous polyurethane added to  
one or more selected portions of the polyurethane.

47. The vehicle of Claim 45, wherein the  
substrate first surface has one or more recessed portions  
formed therein, and wherein polyurethane is applied in  
the one or more recessed portions.

48. The vehicle of Claim 45, wherein the  
substrate second surface has one or more recessed  
portions formed therein, and wherein polyurethane is  
applied in the one or more recessed portions.



49. The vehicle of Claim 45, wherein the substrate comprises a secondary article integrally formed therewithin and further comprising polyurethane applied to the substrate at one or more areas adjacent the secondary article.

50. The vehicle of Claim 40, wherein the panel is a firewall and the sound attenuating laminate is a dashboard insulator.

51. The vehicle of Claim 40, wherein the panel is a vehicle floor and the sound attenuating laminate is a floor covering.

52. A method of forming a sound absorbing laminate, comprising:

ascertaining acoustic properties of an article on which the sound absorbing laminate is to be placed to identify areas wherein additional sound absorption characteristics are necessary;

forming a substrate in the shape of the article, wherein the substrate comprises opposite first and second surfaces, and wherein the substrate first surface is configured to be attached to the article in face-to-face relationship therewith; and

applying a layer of breathable polyurethane on the substrate second surface, wherein the polyurethane is applied substantially only in the identified areas wherein enhanced sound absorption characteristics are required.

53. The method of Claim 52, further comprising attaching upholstery material to the polyurethane layer.

54. The method of Claim 52, wherein the substrate comprises thermoformable fibrous material.

55. The method of Claim 52, wherein the polyurethane is applied by spraying.

56. The method of Claim 52, wherein the polyurethane comprises a filler selected from the group consisting of calcium carbonate, calcium hydroxide, aluminum trihydrate, talc, bentonite, barytes, silica, clay and mica.

57. The method of Claim 52, wherein the article is a vehicle firewall and the sound absorbing laminate is a dashboard insulator.

58. The method of Claim 52, wherein the article is a vehicle floor and the sound absorbing laminate is a floor covering.

59. The method of Claim 52, wherein the article is a vehicle panel and the sound absorbing laminate is a vehicle interior trim component.

60. The method of Claim 52, wherein applying polyurethane on the substrate comprises:

applying polyurethane on the substrate to form a polyurethane layer having a substantially constant thickness; and

spraying additional polyurethane on one or more selected portions of the polyurethane layer.

61. The method of Claim 52, wherein applying polyurethane on the substrate comprises applying polyurethane on the substrate to form a polyurethane layer having a first thickness in a first portion and a second thickness greater than the first thickness in a second portion.

62. The method of Claim 52, wherein applying polyurethane on the substrate comprises:

identifying areas of the substrate in which apertures are to be formed; and

5 avoiding the identified areas when applying the polyurethane onto the substrate.

63. The method of Claim 52, wherein the substrate has one or more recessed portions formed therein, and wherein applying polyurethane onto the substrate comprises applying polyurethane into the one or  
5 more recessed portions.

64. The method of Claim 52, wherein forming a substrate in the shape of the article comprises integrally forming a secondary article with the substrate, and wherein applying polyurethane onto the  
5 substrate comprises applying polyurethane into areas adjacent the secondary article.

65. A method of forming a sound absorbing laminate, comprising:

ascertaining acoustic properties of an article on which the sound absorbing laminate is to be placed to  
5 identify areas wherein additional sound absorption characteristics are necessary;

applying a layer of breathable polyurethane within a mold;

10 applying additional breathable polyurethane to the breathable polyurethane layer at selected locations where enhanced sound absorption characteristics are required;

attaching a substrate to the layer of breathable polyurethane; and

15 forming the substrate and breathable polyurethane via the mold into a sound absorbing laminate

having a shape of the article, wherein the substrate is configured to be attached to the article in face-to-face relationship therewith.

66. The method of Claim 65, further comprising attaching upholstery material to the sound absorbing laminate.

67. The method of Claim 65, wherein the substrate comprises thermoformable fibrous material.

68. The method of Claim 65, wherein the polyurethane is applied by spraying.

69. The method of Claim 65, wherein the polyurethane comprises a filler selected from the group consisting of calcium carbonate, calcium hydroxide, aluminum trihydrate, talc, bentonite, barytes, silica, clay and mica.

70. The method of Claim 65, wherein the article is a vehicle firewall and the sound absorbing laminate is a dashboard insulator.

71. The method of Claim 65, wherein the article is a vehicle floor and the sound absorbing laminate is a floor covering.

72. The method of Claim 65, wherein the article is a vehicle panel and the sound absorbing laminate is a vehicle interior trim component.

73. A sound absorbing laminate, comprising:  
a substrate in the shape of an article, wherein the substrate comprises opposite first and second surfaces, and wherein the substrate first surface is

5 configured to be attached to the article in face-to-face relationship therewith; and

a layer of breathable polyurethane on the substrate second surface, wherein the polyurethane is configured to enhance sound absorption characteristics.

74. The sound absorbing laminate of Claim 73, further comprising upholstery material attached to the polyurethane layer in face-to-face contacting relationship therewith.

75. The sound absorbing laminate of Claim 73, wherein the substrate comprises thermoformable fibrous material.

76. The sound absorbing laminate of Claim 73, wherein the polyurethane comprises a filler selected from the group consisting of calcium carbonate, calcium hydroxide, aluminum trihydrate, talc, bentonite, barytes, silica, clay and mica.

77. The sound absorbing laminate of Claim 73, wherein the article is a vehicle firewall and the sound absorbing laminate is a dashboard insulator.

78. The sound absorbing laminate of Claim 73, wherein the article is a vehicle floor and the sound absorbing laminate is a floor covering.

79. The sound absorbing laminate of Claim 73, wherein the article is a vehicle panel and the sound absorbing laminate is a vehicle interior trim component.

80. The sound absorbing laminate of Claim 73, wherein the polyurethane has a non-constant thickness on the substrate.

81. The sound absorbing laminate of Claim 73, wherein the substrate has one or more recessed portions formed therein, and wherein polyurethane is disposed within the one or more recessed portions.

82. The sound absorbing laminate of Claim 73, wherein the substrate comprises a secondary article integrally formed therewithin and further comprising polyurethane applied to the substrate at one or more areas adjacent the secondary article.

83. A vehicle, comprising:  
a panel; and  
a sound absorbing laminate attached to the panel, wherein the sound absorbing laminate comprises:  
a substrate in the shape of the panel,  
wherein the substrate comprises opposite first and second surfaces, and wherein the substrate first surface is configured to be attached to the panel in face-to-face relationship therewith; and  
a layer of breathable polyurethane on the substrate second surface, wherein the polyurethane is configured to enhance sound absorption characteristics.

84. The vehicle of Claim 83 further comprising upholstery material attached to the polyurethane layer in face-to-face contacting relationship therewith.

85. The vehicle of Claim 83, wherein the substrate comprises thermoformable fibrous material.

86. The vehicle of Claim 83 wherein the polyurethane comprises a filler selected from the group consisting of calcium carbonate, calcium hydroxide,

aluminum trihydrate, talc, bentonite, barytes, silica,  
clay and mica.

87. The vehicle of Claim 83, wherein the panel is a firewall and the sound absorbing laminate is a dashboard insulator.

88. The vehicle of Claim 83, wherein the panel is a vehicle floor and the sound absorbing laminate is a floor covering.

89. The vehicle of Claim 83, wherein the polyurethane has a non-constant thickness on the substrate.

90. The vehicle of Claim 83, wherein the substrate has one or more recessed portions formed therein, and wherein polyurethane is disposed within the one or more recessed portions.

91. The vehicle of Claim 83, wherein the substrate comprises a secondary article integrally formed therewithin and further comprising polyurethane applied to the substrate at one or more areas adjacent the secondary article.

92. A method of producing a carpet assembly for use in vehicles, comprising:

providing a substrate having opposite first and second surfaces, wherein the substrate first surface is configured to be attached to a vehicle panel in contacting face-to-face relationship therewith, and wherein the substrate has elastic memory such that the substrate is unable to maintain an unassisted non-flat configuration;

applying a layer of uncured, breathable

polyurethane onto the substrate second surface such that the substrate becomes moldable;

attaching a porous carpet layer to the substrate, wherein the carpet layer comprises a backing, and wherein the backing is in contacting face-to-face relationship with the breathable polyurethane layer;

forming the carpet layer and substrate into a desired shape; and

subjecting the breathable polyurethane layer to conditions sufficient to cure breathable polyurethane layer such that the substrate and carpet layer are bonded together to form a porous, breathable carpet assembly having the desired shape.

93. The method of Claim 92, wherein applying a layer of uncured, breathable polyurethane onto the substrate second surface comprises spraying uncured, breathable polyurethane onto the substrate second surface.

94. The method of Claim 92, wherein the substrate comprises thermoformable fibrous material selected from the group consisting of natural fibers, man-made fibers, and blends of natural fiber and man-made fibers.

95. The method of Claim 92, further comprising applying additional breathable polyurethane on one or more selected portions of the substrate first surface to enhance sound absorption characteristics of the carpet assembly.

96. The method of Claim 92, further comprising applying polyurethane on one or more selected portions of the substrate first surface, wherein the polyurethane is non-porous and is configured to enhance sound attenuation



5 characteristics of the carpet assembly.

97. A porous, breathable carpet assembly for use in vehicles, comprising:

5 a substrate having opposite first and second surfaces, wherein the substrate first surface is configured to be attached to a vehicle panel in contacting face-to-face relationship therewith, and wherein the substrate has elastic memory such that the substrate is unable to maintain an unassisted non-flat configuration; and

10 a porous carpet layer adhesively secured to the substrate via a breathable polyurethane layer, wherein the carpet layer comprises a backing, and wherein the backing is in contacting face-to-face relationship with the breathable polyurethane layer.

98. The porous, breathable carpet assembly of Claim 97, wherein the substrate comprises thermoformable fibrous material selected from the group consisting of natural fibers, man-made fibers, and blends of natural

5 fiber and man-made fibers.

99. The porous, breathable carpet assembly of Claim 97, further comprising additional breathable polyurethane on one or more selected portions of the substrate first surface, wherein the additional

5 breathable polyurethane enhances sound absorption characteristics of the carpet assembly.

100. The porous, breathable carpet assembly of Claim 97, further comprising additional polyurethane on one or more selected portions of the substrate first surface, wherein the additional polyurethane is non-porous and is configured to enhance sound attenuation

5 characteristics of the carpet assembly.

101. The porous, breathable carpet assembly of Claim 97, wherein the substrate first surface has one or more recessed portions formed therein, and further comprising polyurethane applied within the one or more recessed portions.

102. A vehicle, comprising:  
a floor panel; and  
a porous, breathable carpet assembly attached to the floor panel, wherein the porous, breathable carpet assembly comprises:

a substrate having opposite first and second surfaces, wherein the substrate first surface is configured to be attached to a vehicle panel in contacting face-to-face relationship therewith, and wherein the substrate has elastic memory such that the substrate is unable to maintain an unassisted non-flat configuration; and

a porous carpet layer adhesively secured to the substrate via a breathable polyurethane layer, wherein the carpet layer comprises a backing, and wherein the backing is in contacting face-to-face relationship with the breathable polyurethane layer.

103. The vehicle of Claim 102, wherein the substrate comprises thermoformable fibrous material selected from the group consisting of natural fibers, man-made fibers, and blends of natural fiber and man-made fibers.

104. The vehicle of Claim 102, further comprising additional breathable polyurethane on one or more selected portions of the substrate first surface, wherein the additional breathable polyurethane enhances

5 sound absorption characteristics of the carpet assembly.

105. The vehicle of Claim 102, further comprising additional polyurethane on one or more selected portions of the substrate first surface, wherein the additional polyurethane is non-porous and is  
5 configured to enhance sound attenuation characteristics of the carpet assembly.

106. The vehicle of Claim 102, wherein the substrate first surface has one or more recessed portions formed therein, and further comprising polyurethane applied within the one or more recessed portions.